A NANOSECOND-RESOLVED ULTRAHIGH-DENSITY SPIN-POLARIZED HYDROGEN MAGNETOMETER

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We introduce a novel and sensitive ns-resolved atomic magnetometer, which is at least three orders of magnitude faster than conventional magnetometers. The magnetic field dependence of hyperfine beating of high-density spin-polarized H atoms, produced from the rapid photodissociation of HCl gas with sub-ns laser pulses, results in a few nT sensitivity for a spin-projection limited sensor with 10 nl measurement volume after 1 ns measurement time. The magnetometer will allow ultrafast continuous B-field measurements in many fields, including spin chemistry, spin physics, and plasma physics.